

Family: *Amaranthaceae*

Taxon: *Atriplex lentiformis*

Synonym: *Atriplex breweri* S. Watson
Obione lentiformis Torr. (basionym)

Common Name: quailbush
big saltbrush
lenscale

Questionnaire :	current 20090513	Assessor:	Assessor	Designation:	H(HPWRA)
Status:	Assessor Approved	Data Entry Person:	Assessor	WRA Score	7
101	Is the species highly domesticated?		y=-3, n=0		n
102	Has the species become naturalized where grown?		y=1, n=-1		
103	Does the species have weedy races?		y=1, n=-1		
201	Species suited to tropical or subtropical climate(s) - If island is primarily wet habitat, then substitute "wet tropical" for "tropical or subtropical"		(0-low; 1-intermediate; 2-high) (See Appendix 2)		High
202	Quality of climate match data		(0-low; 1-intermediate; 2-high) (See Appendix 2)		High
203	Broad climate suitability (environmental versatility)		y=1, n=0		y
204	Native or naturalized in regions with tropical or subtropical climates		y=1, n=0		y
205	Does the species have a history of repeated introductions outside its natural range?		y=-2, ?=-1, n=0		y
301	Naturalized beyond native range		y = 1*multiplier (see Appendix 2), n= question 205		y
302	Garden/amenity/disturbance weed		n=0, y = 1*multiplier (see Appendix 2)		n
303	Agricultural/forestry/horticultural weed		n=0, y = 2*multiplier (see Appendix 2)		n
304	Environmental weed		n=0, y = 2*multiplier (see Appendix 2)		n
305	Congeneric weed		n=0, y = 1*multiplier (see Appendix 2)		y
401	Produces spines, thorns or burrs		y=1, n=0		n
402	Allelopathic		y=1, n=0		
403	Parasitic		y=1, n=0		n
404	Unpalatable to grazing animals		y=1, n=-1		n
405	Toxic to animals		y=1, n=0		n
406	Host for recognized pests and pathogens		y=1, n=0		n
407	Causes allergies or is otherwise toxic to humans		y=1, n=0		
408	Creates a fire hazard in natural ecosystems		y=1, n=0		n
409	Is a shade tolerant plant at some stage of its life cycle		y=1, n=0		n
410	Tolerates a wide range of soil conditions (or limestone conditions if not a volcanic island)		y=1, n=0		y

411	Climbing or smothering growth habit	y=1, n=0	n
412	Forms dense thickets	y=1, n=0	y
501	Aquatic	y=5, n=0	n
502	Grass	y=1, n=0	n
503	Nitrogen fixing woody plant	y=1, n=0	n
504	Geophyte (herbaceous with underground storage organs -- bulbs, corms, or tubers)	y=1, n=0	n
601	Evidence of substantial reproductive failure in native habitat	y=1, n=0	n
602	Produces viable seed	y=1, n=-1	y
603	Hybridizes naturally	y=1, n=-1	
604	Self-compatible or apomictic	y=1, n=-1	
605	Requires specialist pollinators	y=-1, n=0	n
606	Reproduction by vegetative fragmentation	y=1, n=-1	n
607	Minimum generative time (years)	1 year = 1, 2 or 3 years = 0, 4+ years = -1	3
701	Propagules likely to be dispersed unintentionally (plants growing in heavily trafficked areas)	y=1, n=-1	n
702	Propagules dispersed intentionally by people	y=1, n=-1	y
703	Propagules likely to disperse as a produce contaminant	y=1, n=-1	n
704	Propagules adapted to wind dispersal	y=1, n=-1	y
705	Propagules water dispersed	y=1, n=-1	y
706	Propagules bird dispersed	y=1, n=-1	
707	Propagules dispersed by other animals (externally)	y=1, n=-1	
708	Propagules survive passage through the gut	y=1, n=-1	
801	Prolific seed production (>1000/m2)	y=1, n=-1	
802	Evidence that a persistent propagule bank is formed (>1 yr)	y=1, n=-1	
803	Well controlled by herbicides	y=-1, n=1	
804	Tolerates, or benefits from, mutilation, cultivation, or fire	y=1, n=-1	n
805	Effective natural enemies present locally (e.g. introduced biocontrol agents)	y=-1, n=1	

Designation: H(HPWRA)

WRA Score 7

Supporting Data:

101	2005. Meyer, R.. <i>Atriplex lentiformis</i> . In: Fire Effects Information System, [Online]. USA Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory, http://www.fs.fed.us/database/feis/plants/shrub/atrlen/all.html [Accessed 03 July 2013]	[Is the species highly domesticated? No] No evidence
102	2013. WRA Specialist. Personal Communication.	NA
103	2013. WRA Specialist. Personal Communication.	NA
201	2005. Meyer, R.. <i>Atriplex lentiformis</i> . In: Fire Effects Information System, [Online]. USA Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory, http://www.fs.fed.us/database/feis/plants/shrub/atrlen/all.html [Accessed 03 July 2013]	[Species suited to tropical or subtropical climate(s) 2-High] "Big saltbrush occurs from central California east into southern Nevada and extreme southwestern Utah and south through western and central Arizona into Baja California and Sonora, Mexico [8,57,73,119,123]. Quailbush is limited to coastal regions of central and southern California and some nearby islands [46,74]."
202	2005. Meyer, R.. <i>Atriplex lentiformis</i> . In: Fire Effects Information System, [Online]. USA Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory, http://www.fs.fed.us/database/feis/plants/shrub/atrlen/all.html [Accessed 03 July 2013]	[Quality of climate match data? 2-High]
203	2005. Meyer, R.. <i>Atriplex lentiformis</i> . In: Fire Effects Information System, [Online]. USA Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory, http://www.fs.fed.us/database/feis/plants/shrub/atrlen/all.html [Accessed 03 July 2013]	[Broad climate suitability (environmental versatility)? Yes] "Elevations where big saltbrush occurs range from sea level [90] up to 4,000 feet (1,219 m) in Arizona and Mexico [57,90]." [Environmental versatility - elevation range exceeds 1000 m]
204	1999. Wagner, W.L./Herbst, D.R./Sohmer, S.H.. Manual of the flowering plants of Hawaii. Revised edition.. University of Hawai'i Press and Bishop Museum Press, Honolulu, HI.	[Native or naturalized in regions with tropical or subtropical climates? Yes] "now naturalized in Kaunakakai, Molokai. First collected in 1915"
205	2005. Meyer, R.. <i>Atriplex lentiformis</i> . In: Fire Effects Information System, [Online]. USA Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory, http://www.fs.fed.us/database/feis/plants/shrub/atrlen/all.html [Accessed 03 July 2013]	[Does the species have a history of repeated introductions outside its natural range? Yes] "Big saltbrush's value as livestock forage and in disturbed site rehabilitation are two major reasons for its introduction into several areas, including Hawaii [8,55,65,109], Australia [6,60,62], and the Middle East [59]."
301	1999. Wagner, W.L./Herbst, D.R./Sohmer, S.H.. Manual of the flowering plants of Hawaii. Revised edition.. University of Hawai'i Press and Bishop Museum Press, Honolulu, HI.	[Naturalized beyond native range? Yes] "now naturalized in Kaunakakai, Molokai. First collected in 1915"
301	2004. Keighery, G./Longman, V.. The naturalized vascular plants of Western Australia 1: Checklist, environmental weeds and distribution in IBRA regions. <i>Plant Protection Quarterly</i> . 19(1): 12-32.	[Naturalized beyond native range? Yes] "There are 1233 naturalized vascular plant taxa recorded for Western Australia" [Includes <i>Atriplex lentiformis</i>]
302	2010. Abella, S.R.. Disturbance and plant succession in the Mojave and Sonoran Deserts of the American Southwest. <i>International Journal of Environmental Research and Public Health</i> . 7(4): 1248-1284.	[Garden/amenity/disturbance weed? Not regarded as a weed, but adapted for disturbed areas] "Big saltbush (<i>Atriplex lentiformis</i>) was not recorded in undisturbed vegetation but comprised 17–24% of the relative cover in the disturbed areas."
303	1999. Wagner, W.L./Herbst, D.R./Sohmer, S.H.. Manual of the flowering plants of Hawaii. Revised edition.. University of Hawai'i Press and Bishop Museum Press, Honolulu, HI.	[Agricultural/forestry/horticultural weed? No] "in Hawaii, introduced as cattle fodder..." [Valued for its palatability]
303	2012. Randall, R.P.. <i>A Global Compendium of Weeds</i> . 2nd Edition. Department of Agriculture and Food, Western Australia	[Agricultural/forestry/horticultural weed? No] No evidence
304	2012. Randall, R.P.. <i>A Global Compendium of Weeds</i> . 2nd Edition. Department of Agriculture and Food, Western Australia	[Environmental weed? No] No evidence

305	2003. Weber, E.. Invasive Plant Species of the World. A Reference Guide to Environmental Weeds. CABI Publishing, Wallingford, UK	[Congeneric weed? Yes] "Atriplex semibaccata" ... "A ground-spreading plant that displaces native species." ... "Once established, it persists and may become dominant over large areas."
401	2005. Meyer, R.. Atriplex lentiformis. In: Fire Effects Information System, [Online]. USA Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory, http://www.fs.fed.us/database/feis/plants/shrub/atrlen/all.html [Accessed 03 July 2013]	[Produces spines, thorns or burrs? No] "Big saltbrush is a large, perennial, native shrub. It typically grows to between 3.3 and 8.2 feet (1 2.5 m) tall, but can reach 9.8 feet (3 m) [8,57,79,90,119] Plants are wide spreading [25,113]. Individuals approximately 6.6 feet (2 m) tall were reported to cover areas ranging from 5.6 m ² to 7.8 m ² [5], and some plants reach coverages of up to 10 m ² [79]. Big saltbrush is typically evergreen, but can be drought deciduous in some desert environments [25,28,113,119]. The numerous leaves of big saltbrush are somewhat thick, about 0.4 to 2 inches (1-5 cm) long, 0.25 to 1.5 inches (0.3 4 cm) wide, and covered in fine scales [8,25,113,119]. Big saltbrush branches are numerous and slender. The bark is typically covered in fine scales when young and becomes rough on old trunks [113]."
402	2010. Hamedanian, F./Jafari, M./Dehdari, S./Henteh, A./Chahouki, M.Z.. The allelopathic effects of Atriplex canescens (Four wing saltbush) on seed germination of Salsola rigida. Desert. 15: 15-18.	[Allelopathic? Unknown. Related species demonstrate allelopathic properties] "The results indicated that the available material in shoots of Atriplex canescens (fruits and leaves) exhibited allelopathic effect on germination of Salsola rigida. The highest percentage of germination was obtained from control while the lowest from the 100% treatment. In fact after exceeding of 25% concentration, germination reached its lowest percentage due to Atriplex effects." ... "Henteh (5) concluded that Atriplex canescens has preventive effects on such native species as Artemisia sieberi in rangelands, while Jafari et.al. (7), Khalkhali (9), and Tavakoli (18) believe Atriplex is of positive ecological effects on environments, where it is cultivated."
403	2005. Meyer, R.. Atriplex lentiformis. In: Fire Effects Information System, [Online]. USA Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory, http://www.fs.fed.us/database/feis/plants/shrub/atrlen/all.html [Accessed 03 July 2013]	[Parasitic? No] "Big saltbrush is a large, perennial, native shrub."
404	1999. Wagner, W.L./Herbst, D.R./Sohmer, S.H.. Manual of the flowering plants of Hawaii. Revised edition.. University of Hawai'i Press and Bishop Museum Press, Honolulu, HI.	[Unpalatable to grazing animals? No] "in Hawaii, introduced as cattle fodder..."
404	2005. Meyer, R.. Atriplex lentiformis. In: Fire Effects Information System, [Online]. USA Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory, http://www.fs.fed.us/database/feis/plants/shrub/atrlen/all.html [Accessed 03 July 2013]	[Unpalatable to grazing animals? No] "Leaves and seeds of big saltbrush are eaten by many species. Mule deer, pronghorn, and livestock browse the leaves [6,25,57,84,94,113]. In literature reviews, small mammals such as rabbits and rodents have been reported to eat big saltbrush [44,84]. Briggs and Cornelius [13] report rabbit damage to big saltbrush in a revegetation plot and Everett and others [32] report that, although big saltbrush was one of the least preferred species in their laboratory trials, deer mice ate its seeds. Reviews have included big saltbrush as a component of the diet of several game birds [30,44]. In a literature review, Gullion [44] noted use of big saltbrush by ring-necked pheasants and Gambel's quail. Big saltbrush is also important to some insects. The saltbush sootywing uses big saltbrush as one of its hosts as a caterpillar and feeds on the nectar of big saltbrush flowers as an adult [81]."
405	2005. Meyer, R.. Atriplex lentiformis. In: Fire Effects Information System, [Online]. USA Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory, http://www.fs.fed.us/database/feis/plants/shrub/atrlen/all.html [Accessed 03 July 2013]	[Toxic to animals? No] "Leaves and seeds of big saltbrush are eaten by many species." [No evidence]
406	2005. Meyer, R.. Atriplex lentiformis. In: Fire Effects Information System, [Online]. USA Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory, http://www.fs.fed.us/database/feis/plants/shrub/atrlen/all.html [Accessed 03 July 2013]	[Host for recognized pests and pathogens? No] No evidence
406	2012. EnviroControl. Quail Bush. http://www.envirocontrol-llc.com/products/quail-bush/ [Accessed 03 July 2013]	[Host for recognized pests and pathogens? No] "Quail Bushes are relatively pest-free, but are subject to Chlorosis when exposed to excessive amounts of water. In nature, these shrubs are in frequent competition with the invasive Saltcedar (Tamarisk ramosissima)"

407	2005. Meyer, R.. <i>Atriplex lentiformis</i> . In: Fire Effects Information System, [Online]. USA Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory, http://www.fs.fed.us/database/feis/plants/shrub/atrlen/all.html [Accessed 03 July 2013]	[Causes allergies or is otherwise toxic to humans? Non-toxic but a potential allergen] "Traditional Uses: Castetter's [21] literature review of studies on tribes of the American southwest included information regarding the Pima Indians' practice of pit curing and drying big saltbrush seeds before using them to make a thick gruel. Bean and Saubel [7] report a similar practice among the Chaulilla as well as use of the flour to make small cakes, use of leaves as a soap, and use of flowers, stems and leaves as a treatment for nasal congestion. Conrad [25] suggests that seeds were likely used in a similar way to fourwing saltbush. Seeds of fourwing saltbush were also reportedly ground into flour. Other uses for fourwing saltbrush that may have been similar for big saltbrush are the use of the ground meal as an emetic, use of ground flowers or roots moistened with saliva in treating ant bites, and addition of ashes to water for dyeing meal greenish-blue [25]." ... "Vines [113] notes that big saltbrush is a suspected hay fever plant."
408	2005. Meyer, R.. <i>Atriplex lentiformis</i> . In: Fire Effects Information System, [Online]. USA Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory, http://www.fs.fed.us/database/feis/plants/shrub/atrlen/all.html [Accessed 03 July 2013]	[Creates a fire hazard in natural ecosystems? No] "Big saltbrush has been shown to have reduced flammability due to high moisture and ash contents. Montgomery and Cheo [72] reported reduced flammability of 3.2 to 4 inch (8-10 cm) cuttings of big saltbrush terminal growth due to its naturally high moisture content."
409	2008. Irish, M.. <i>Trees and Shrubs for the Southwest: Woody Plants for Arid Gardens</i> . Timber Press, Portland, OR	[Is a shade tolerant plant at some stage of its life cycle? No] "Exposure: Full sun in all areas"
410	2005. Meyer, R.. <i>Atriplex lentiformis</i> . In: Fire Effects Information System, [Online]. USA Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory, http://www.fs.fed.us/database/feis/plants/shrub/atrlen/all.html [Accessed 03 July 2013]	[Tolerates a wide range of soil conditions ? Yes] "Soil: Big saltbrush is typically found in moist to dry alkaline or saline soils [37,57,90,111], and has low tolerance for acidity [90]." ... "Big saltbrush occurs in a variety of soil textures from quite coarse soils, especially in the case of the quailbush, which can grow in pure sand [96] to silty loams and silty clay loams [63]."
410	2006. USDA NRCS. Plant Guide - Quailbush - <i>Atriplex lentiformis</i> . USDA NRCS National Plant Data Center, plants.usda.gov/plantguide/pdf/pg_atle.pdf	[Tolerates a wide range of soil conditions ? Yes] "Quailbush grows best with full sunlight in any well-drained but not too fertile soil. It tolerates very alkaline soils and can succeed in hot and dry climates."
411	1999. Wagner, W.L./Herbst, D.R./Sohmer, S.H.. <i>Manual of the flowering plants of Hawaii</i> . Revised edition.. University of Hawai'i Press and Bishop Museum Press, Honolulu, HI.	[Climbing or smothering growth habit? No] "Erect, widely spreading shrubs; stems sprawling, 10-30 dm long, ± spinose. Leaves oblong to ovate-deltate, 1.5-4(-5) cm long, 0.5-2.5 cm wide, usually densely grayish mealy pubescent."
412	2007. Clarke, O.F.. <i>Flora of the Santa Ana River and Environs: With References to World Botany</i> . Heyday Books, Berkeley, CA	[Forms dense thickets? Yes] " <i>Atriplex lentiformis</i> (Big Saltbush) is the tallest <i>Atriplex</i> , reaching 3.5 m, and can form impenetrable thickets."
412	2013. Boone, J.. Quailbush (<i>Atriplex lentiformis</i>). http://www.birdandhike.com/Veg/Species/Shrubs/Atriplex/Atriplex.html [Accessed 03 July 2013]	[Forms dense thickets? Yes] "Quailbush make large, dense thickets in which quail, rabbits, and other animals like to hide."
501	2005. Meyer, R.. <i>Atriplex lentiformis</i> . In: Fire Effects Information System, [Online]. USA Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory, http://www.fs.fed.us/database/feis/plants/shrub/atrlen/all.html [Accessed 03 July 2013]	[Aquatic? No, but occurs in riparian areas] "In the desert Southwest big saltbrush occurs in valleys [108,123], along smaller waterways, including outwash bajadas [119,123], on floodplains [63,79,123], in alkaline flats [74,113,123], and in saline areas [25,74]. In coastal regions big saltbrush, most often quailbush, occurs in saline areas [25,74], floodplains, and near the bottom of coastal bluffs [45,86]."
502	2013. USDA ARS National Genetic Resources Program. Germplasm Resources Information Network - (GRIN). http://www.ars-grin.gov/cgi-bin/npgs/html/index.pl	[Grass? No] Amaranthaceae [Also placed in Chenopodiaceae]
503	2013. USDA ARS National Genetic Resources Program. Germplasm Resources Information Network - (GRIN). http://www.ars-grin.gov/cgi-bin/npgs/html/index.pl	[Nitrogen fixing woody plant? No] Amaranthaceae [Also placed in Chenopodiaceae]
504	1999. Wagner, W.L./Herbst, D.R./Sohmer, S.H.. <i>Manual of the flowering plants of Hawaii</i> . Revised edition.. University of Hawai'i Press and Bishop Museum Press, Honolulu, HI.	[Geophyte (herbaceous with underground storage organs -- bulbs, corms, or tubers)? No] "Erect, widely spreading shrubs; stems sprawling, 10-30 dm long, ± spinose."
601	2005. Meyer, R.. <i>Atriplex lentiformis</i> . In: Fire Effects Information System, [Online]. USA Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory, http://www.fs.fed.us/database/feis/plants/shrub/atrlen/all.html [Accessed 03 July 2013]	[Evidence of substantial reproductive failure in native habitat? No] No evidence

602	2005. Meyer, R.. <i>Atriplex lentiformis</i> . In: Fire Effects Information System, [Online]. USA Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory, http://www.fs.fed.us/database/feis/plants/shrub/atrlen/all.html [Accessed 03 July 2013]	[Produces viable seed? Yes] "Big saltbrush has been reported to produce an abundance of seeds [25], but quantitative data illustrating this are not available."
603	2005. Meyer, R.. <i>Atriplex lentiformis</i> . In: Fire Effects Information System, [Online]. USA Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory, http://www.fs.fed.us/database/feis/plants/shrub/atrlen/all.html [Accessed 03 July 2013]	[Hybridizes naturally? Possibly] "Big saltbrush may not regularly hybridize, even though it occurs with several <i>Atriplex</i> species [46]. However, Hanson [46] reports hybrids of quailbush and beach saltbush (<i>A. leucophylla</i>) and quailbush and Davidson's bractscale (<i>A. serenana</i> var. <i> davidsonii</i>) in the collections of the California Academy of Sciences."
604	2005. Meyer, R.. <i>Atriplex lentiformis</i> . In: Fire Effects Information System, [Online]. USA Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory, http://www.fs.fed.us/database/feis/plants/shrub/atrlen/all.html [Accessed 03 July 2013]	[Self-compatible or apomictic? Unknown] "Big saltbrush can be either monoecious or dioecious [113,119,123]. In plantings done to determine potential of big saltbrush as a forage crop the sex ratio was 60% male plants, 10% female plants, and 30% monoecious plants [117]. In their 1984 article, Freeman and others [35] included data from previous research demonstrating change of sex in big saltbrush. Plants typically change from dioecious to monoecious, but can also change from female to male. The ability to change sex appeared to enhance survival and may provide a reproductive advantage to the population."
605	2005. Meyer, R.. <i>Atriplex lentiformis</i> . In: Fire Effects Information System, [Online]. USA Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory, http://www.fs.fed.us/database/feis/plants/shrub/atrlen/all.html [Accessed 03 July 2013]	[Requires specialist pollinators? No] "According to Meyer [69] saltbush species are wind pollinated, but evidence demonstrating this for big saltbrush is lacking. Saltbush sootywing butterflies feed on big saltbrush nectar [81]. Whether they or other insects transfer pollen while feeding is not reported."
605	2005. Turner, R.M./Bowers, J.E./Burgess, T.L.. <i>Sonoran Desert Plants: An Ecological Atlas</i> . University of Arizona Press, Tucson, AZ	[Requires specialist pollinators? No] "The flowers are wind pollinated."
606	2005. Meyer, R.. <i>Atriplex lentiformis</i> . In: Fire Effects Information System, [Online]. USA Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory, http://www.fs.fed.us/database/feis/plants/shrub/atrlen/all.html [Accessed 03 July 2013]	[Reproduction by vegetative fragmentation? No] "Asexual regeneration: There have been no reports of big saltbrush reproducing asexually in the wild."
607	2005. Meyer, R.. <i>Atriplex lentiformis</i> . In: Fire Effects Information System, [Online]. USA Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory, http://www.fs.fed.us/database/feis/plants/shrub/atrlen/all.html [Accessed 03 July 2013]	[Minimum generative time (years)? 3] "In a review of revegetation projects, Briggs and Cornelius [13] report that some big saltbrush grew to over 3 feet (1 m) and were producing seed after 3 growing seasons at Mittry Lake in Arizona."
701	2005. Meyer, R.. <i>Atriplex lentiformis</i> . In: Fire Effects Information System, [Online]. USA Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory, http://www.fs.fed.us/database/feis/plants/shrub/atrlen/all.html [Accessed 03 July 2013]	[Propagules likely to be dispersed unintentionally (plants growing in heavily trafficked areas)? No] "The fruits are utricles with bracts typically 0.1 to 0.15 inch (3-4 mm) long and wide, which contain a seed 0.04 to 0.06 inch (1-1.5 mm) wide [8,69,119]." [Seeds are small and could be inadvertently dispersed, but lack means of external attachment]
702	1999. Wagner, W.L./Herbst, D.R./Sohmer, S.H.. <i>Manual of the flowering plants of Hawaii</i> . Revised edition.. University of Hawai'i Press and Bishop Museum Press, Honolulu, HI.	[Propagules dispersed intentionally by people? Initially yes] "in Hawaii, introduced as cattle fodder..."
702	2005. Meyer, R.. <i>Atriplex lentiformis</i> . In: Fire Effects Information System, [Online]. USA Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory, http://www.fs.fed.us/database/feis/plants/shrub/atrlen/all.html [Accessed 03 July 2013]	[Propagules dispersed intentionally by people? Yes within native range] "Quailbush is used as a hedge plant in coastal California"
703	2005. Meyer, R.. <i>Atriplex lentiformis</i> . In: Fire Effects Information System, [Online]. USA Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory, http://www.fs.fed.us/database/feis/plants/shrub/atrlen/all.html [Accessed 03 July 2013]	[Propagules likely to disperse as a produce contaminant? No] "...seed dispersal occurs mainly by water and vertebrates."
704	1992. Tesky, J.L.. <i>Atriplex lentiformis</i> . http://reference.allrefer.com/wildlife-plants-animals/plants/shrub/atrlen/all.html [Accessed 03 July 2013]	[Propagules adapted to wind dispersal? Yes] "Seeds and Germination: Big saltbrush plants produce many seeds [27,29] which are borne on bracts and wind dispersed [21]. Seeds germinate well without pretreatment or light [30,34]."

705	2005. Meyer, R.. <i>Atriplex lentiformis</i> . In: Fire Effects Information System, [Online]. USA Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory, http://www.fs.fed.us/database/feis/plants/shrub/atrlen/all.html [Accessed 03 July 2013]	[Propagules water dispersed? Yes] "Ohmart and Anderson [79] note that seed dispersal occurs mainly by water and vertebrates. " ... "In the desert Southwest big saltbrush occurs in valleys [108,123], along smaller waterways, including outwash bajadas [119,123], on floodplains [63,79,123], in alkaline flats [74,113,123], and in saline areas [25,74]. In coastal regions big saltbrush, most often quailbush, occurs in saline areas [25,74], floodplains, and near the bottom of coastal bluffs [45,86]. "
706	2005. Meyer, R.. <i>Atriplex lentiformis</i> . In: Fire Effects Information System, [Online]. USA Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory, http://www.fs.fed.us/database/feis/plants/shrub/atrlen/all.html [Accessed 03 July 2013]	[Propagules bird dispersed? Unknown] "Several species, including ring-necked pheasants and Gambel's quail, are known to eat big saltbrush seeds [25,44], but there is no research addressing bird dispersal of big saltbrush seeds." [Unknown if viable seeds are dispersed by birds]
707	2005. Meyer, R.. <i>Atriplex lentiformis</i> . In: Fire Effects Information System, [Online]. USA Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory, http://www.fs.fed.us/database/feis/plants/shrub/atrlen/all.html [Accessed 03 July 2013]	[Propagules dispersed by other animals (externally)? Unknown] "Ohmart and Anderson [79] note that seed dispersal occurs mainly by water and vertebrates." [No means of external attachment, so presumably seeds are dispersed internally, but no further details were found]
708	2005. Meyer, R.. <i>Atriplex lentiformis</i> . In: Fire Effects Information System, [Online]. USA Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory, http://www.fs.fed.us/database/feis/plants/shrub/atrlen/all.html [Accessed 03 July 2013]	[Propagules survive passage through the gut? Possibly Yes] "Ohmart and Anderson [79] note that seed dispersal occurs mainly by water and vertebrates."
801	2005. Meyer, R.. <i>Atriplex lentiformis</i> . In: Fire Effects Information System, [Online]. USA Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory, http://www.fs.fed.us/database/feis/plants/shrub/atrlen/all.html [Accessed 03 July 2013]	[Prolific seed production (>1000/m2)? Unknown] "Big saltbrush has been reported to produce an abundance of seeds [25], but quantitative data illustrating this are not available."
802	2005. Meyer, R.. <i>Atriplex lentiformis</i> . In: Fire Effects Information System, [Online]. USA Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory, http://www.fs.fed.us/database/feis/plants/shrub/atrlen/all.html [Accessed 03 July 2013]	[Evidence that a persistent propagule bank is formed (>1 yr)? Possibly, but unknown from field conditions] "Seed banking: Again there is little information available. However, seeds have been successfully stored in sealed containers for 5 years [8]. Jorgensen [53] reports a maximum storage time of 6 years."
802	2008. Royal Botanic Gardens Kew. Seed Information Database (SID). Version 7.1. http://data.kew.org/sid/	[Evidence that a persistent propagule bank is formed (>1 yr)? Possibly] "Viability maintained for 3 years in storage at room temperature with 6-8% mc (Plummer, 1983); no loss in viability after 5 years storage at -15°C(Kay et al., 1988)"
803	2013. WRA Specialist. Personal Communication.	[Well controlled by herbicides? Unknown] No information on herbicide efficacy or chemical control of this species
804	2005. Meyer, R.. <i>Atriplex lentiformis</i> . In: Fire Effects Information System, [Online]. USA Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory, http://www.fs.fed.us/database/feis/plants/shrub/atrlen/all.html [Accessed 03 July 2013]	[Tolerates, or benefits from, mutilation, cultivation, or fire?] "Big saltbrush can survive at least some fires [16]. The limited information available suggests that the most likely postfire regeneration strategy of big saltbrush is seed production [25,100]. In addition, a study investigating its use as a forage crop demonstrated big saltbrush survival and growth after a harvest of over 50% of the vegetation [117]. Although fire may elicit a different response, it is possible that big saltbrush can persist after substantial damage."
804	2013. Sagebud. Big Saltbush (<i>Atriplex Lentiformis</i>). http://sagebud.com/big-saltbush-atrilex-lentiformis/ [Accessed 03 July 2013]	[Tolerates, or benefits from, mutilation, cultivation, or fire? No] "Coppice Potential: No"
805	2013. WRA Specialist. Personal Communication.	[Effective natural enemies present locally (e.g. introduced biocontrol agents)? Unknown]

Summary of Risk Traits

High Risk / Undesirable Traits

- Environmental versatility - Elevation range exceeds 1000 m
- Naturalized in Molokai, Hawaiian Islands and Western Australia
- Related *Atriplex* species have become invasive
- Pollen is potentially allergenic
- Tolerates many soil types, but especially alkaline soils
- Forms thickets within native range
- Reaches maturity in 3 years
- Plants typically change from dioecious to monoecious, but can also change from female to male.
- Seeds dispersed by wind, water and possibly animals
- Seeds may form a persistent seed bank
- Fire-tolerant

Low Risk / Desirable Traits

- Palatable to cattle
- Thrives in full sun and unlikely to invade densely shaded sites